

**What is claimed is:**

1           1.    An apparatus for transmitting radiation of  
2 multiple wavelengths, comprising:

3           a first input channel carrying radiation of one or  
4           more wavelengths;

5           a first output channel;

6           a second input channel carrying radiation of a first  
7           wavelength to be added;

8           a second output channel for receiving radiation of  
9           at least one wavelength that is to be dropped;  
10          and

11          a switch member having a first filter and a second  
12          filter, wherein the switch member is movable  
13          between two positions;

14          a first connecting channel, wherein when the switch  
15          member is in a first position, the radiation  
16          carried by the first input channel reaches the  
17          first filter, and the radiation of the first  
18          wavelength carried by the second input channel  
19          reaches the second filter, the second output  
20          channel receives the radiation of a  
21          predetermined wavelength carried by the first  
22          input channel, and all of the wavelengths  
23          except the predetermined wavelength in the  
24          radiation carried by the first input channel  
25          enters the first connecting channel, impinging  
26          on the second filter and received by the first  
27          output channel together with the radiation of

28 the first wavelength carried by the second  
29 input channel.

1 2. The apparatus as claimed in claim 1, wherein  
2 the predetermined wavelength and the first wavelength are  
3 in the same waveband, but are different from the  
4 wavebands of the other wavelengths in the radiation  
5 carried by the first input channel.

1 3. The apparatus as claimed in claim 1, wherein  
2 the first input channel is substantially aligned with the  
3 second output channel, and the second input channel is  
4 substantially aligned with the first output channel.

1 4. The apparatus as claimed in claim 1, wherein  
2 the first input channel is substantially aligned with the  
3 first connecting channel, and the first connecting  
4 channel is substantially aligned with the first output  
5 channel.

1 5. The apparatus as claimed in claim 1, wherein the  
2 first filter and the second filter pass the radiation of  
3 the first and the predetermined wavelength and reflect  
4 all of the wavelengths except for the radiation of the  
5 first and the predetermined wavelength.

1 6. The apparatus as claimed in claim 5, wherein  
2 the switch member has a first radiation reflective  
3 portion and a second radiation reflective portion, when  
4 the switch member is in a second position, the radiation  
5 carried by the first input channel is reflected into the  
6 first connecting channel by the first radiation

7 reflective portion, the radiation passing through the  
8 first connecting channel reaches the second radiation  
9 reflective portion, is again reflected into the first  
10 output channel.

1 7. The apparatus as claimed in claim 6, further  
2 comprising a second connecting channel, wherein when the  
3 switch member is in the second position, the radiation of  
4 the first wavelength carried by the second input channel  
5 is reflected into the second connecting channel by the  
6 second radiation reflective portion, the radiation  
7 passing through the second connecting channel reaches the  
8 first radiation reflective portion, and is reflected into  
9 second output channel.

1 8. The apparatus as claimed in claim 7, wherein  
2 the second input channel is substantially aligned with  
3 the second connecting channel, and the second connecting  
4 channel is substantially aligned with the second output  
5 channel.

1 9. The apparatus as claimed in claim 1, wherein the  
2 first filter and the second filter reflect the radiation  
3 of the first and the predetermined wavelength and pass  
4 all of the wavelengths except for the radiation of the  
5 first and the predetermined wavelength.

1 10. The apparatus as claimed in claim 9, wherein  
2 the switch member has a first radiation transmissive  
3 portion and a second radiation transmissive portion, when  
4 the switch member is in a second position, the radiation  
5 carried by the first input channel passes through the

6 first radiation transmissive portion, entering the first  
7 connecting channel, and passes through the second  
8 radiation transmissive portion again, and is received by  
9 the first output channel.

1 11. The apparatus as claimed in claim 10, further  
2 comprising a second connecting channel, wherein when the  
3 switch member is in a second position, the radiation  
4 carried by the second input channel passes through the  
5 second radiation transmissive portion, entering the  
6 second connecting channel, and passes through the second  
7 radiation transmissive portion again, and is received by  
8 the second output channel.

1 12. The apparatus as claimed in claim 11, wherein  
2 the second input channel is substantially aligned with  
3 the second connecting channel, and the second connecting  
4 channel is substantially aligned with the second output  
5 channel.

1 13. An apparatus for transmitting radiation of  
2 multiple wavelengths, comprising:

3 a first input channel carrying radiation of one or  
4 more wavelengths;

5 a first output channel;

6 a second input channel carrying radiation of a first  
7 wavelength to be added;

8 a second output channel for receiving radiation of  
9 at least one wavelength that is to be dropped;  
10 and

11 a switch member having a plurality of filters,  
12 wherein the switch member is movable among a  
13 plurality of positions;

14 a first connecting channel, wherein when the switch  
15 member is in a first position, the radiation  
16 carried by the first input channel and the  
17 second input channel reaches a first filter,  
18 the first filter passes radiation of a  
19 predetermined wavelength in the radiation  
20 carried by the first input channel to the  
21 second output channel and reflects the  
22 remaining wavelengths through the first  
23 connecting channel, reaching the first filter  
24 and reflected again, the reflected radiation of  
25 the remaining wavelengths and the radiation of  
26 the first wavelength passing through the first  
27 filter are received by the first output  
28 channel.

1 14. The apparatus as claimed in claim 13, wherein  
2 the predetermined wavelength and the first wavelength are  
3 in the same waveband, but are different from the  
4 wavebands of the other wavelengths in the radiation  
5 carried by the first input channel.

1 15. The apparatus as claimed in claim 13, wherein  
2 the first input channel is substantially aligned with the  
3 second output channel, and the second input channel is  
4 substantially aligned with the first output channel.

1           16. The apparatus as claimed in claim 13, wherein  
2           the first input channel is substantially aligned with the  
3           first connecting channel, and the first connecting  
4           channel is substantially aligned with the first output  
5           channel.

1           17. The apparatus as claimed in claim 13, wherein  
2           the first filter passes the radiation of the first and  
3           the predetermined wavelength and reflects all of the  
4           wavelengths except for the radiation of the first and the  
5           predetermined wavelength.

1           18. The apparatus as claimed in claim 13, wherein  
2           the switch member has a radiation reflective portion,  
3           when the switch member is in a second position, the  
4           radiation carried by the first input channel is reflected  
5           into the first connecting channel by the radiation  
6           reflective portion, the radiation passing through the  
7           first connecting channel reaches the radiation reflective  
8           portion and is reflected into the first output channel.

1           19. The apparatus as claimed in claim 18, further  
2           comprising a second connecting channel, wherein when the  
3           switch member is in the second position, the radiation of  
4           the first wavelength carried by the second input channel  
5           is reflected into the second connecting channel by the  
6           radiation reflective portion, the radiation passing  
7           through the second connecting channel reaches the  
8           radiation reflective portion again, reflected into second  
9           output channel.

1           20. The apparatus as claimed in claim 19, wherein  
2           the second input channel is substantially aligned with  
3           the second connecting channel, and the second connecting  
4           channel is substantially aligned with the second output  
5           channel.

1           21. The apparatus as claimed in claim 18, wherein  
2           the first input channel, the first output channel and the  
3           first connecting channel are formed by a four-fiber  
4           collimator, the first connecting channel is formed by two  
5           fused fibers of the four-fiber collimator.

1           22. An apparatus for transmitting radiation of  
2           multiple wavelengths, comprising:

3           a first input channel carrying radiation of one or  
4           more wavelengths;

5           a first output channel;

6           a second input channel carrying radiation of a first  
7           wavelength to be added;

8           a second output channel for receiving radiation of  
9           at least one wavelength that is to be dropped;  
10          and

11          a switch member having a plurality of filters,  
12          wherein the switch member is movable among a  
13          plurality of positions;

14          a first connecting channel, wherein when the switch  
15          member is in a first position, the radiation  
16          carried by the first input channel and the  
17          second input channel reaches a first filter,  
18          the first filter reflects radiation of a

19 predetermined wavelength in the radiation  
20 carried by the first input channel to the  
21 second output channel and passes the remaining  
22 wavelengths through the first connecting  
23 channel, reaching the first filter, the  
24 radiation of the remaining wavelengths passing  
25 through the first filter and the radiation of  
26 the first wavelength reflected by the first  
27 filter are received by the first output  
28 channel.

1 23. The apparatus as claimed in claim 22, wherein  
2 the predetermined wavelength and the first wavelength are  
3 in the same waveband, but are different from the  
4 wavebands of the other wavelengths in the radiation  
5 carried by the first input channel.

1 24. The apparatus as claimed in claim 22, wherein  
2 the first input channel is substantially aligned with the  
3 second output channel, and the second input channel is  
4 substantially aligned with the first output channel.

1 25. The apparatus as claimed in claim 22, wherein  
2 the first input channel is substantially aligned with the  
3 first connecting channel, and the first connecting  
4 channel is substantially aligned with the first output  
5 channel.

1 26. The apparatus as claimed in claim 22, wherein  
2 the first filter reflects the radiation of the first and  
3 the predetermined wavelength and pass all of the



wavelengths except for the radiation of the first and the predetermined wavelength.

27. The apparatus as claimed in claim 13, wherein the switch member has a radiation transmissive portion, when the switch member is in a second position, the radiation carried by the first input channel passes through the radiation transmissive portion, entering the first connecting channel, and again passes through the radiation transmissive portion and is received by the first output channel.

28. The apparatus as claimed in claim 27, further comprising a second connecting channel, wherein when the switch member is in the second position, the radiation of the first wavelength carried by the second input channel passes through the radiation transmissive portion, entering the second connecting channel, and again passes through the radiation transmissive portion and is received by the second output channel.

29. The apparatus as claimed in claim 28, wherein the second input channel is substantially aligned with the second connecting channel, and the second connecting channel is substantially aligned with the second output channel.

30. The apparatus as claimed in claim 28, wherein the first connecting channel and the second connecting channel are formed by a four-fiber collimator, the first connecting channel and the second connecting channel are

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5 separately formed by two fused fibers of the four-fiber  
6 collimator.